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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,526	12/05/2003	Naoto Morikawa	60414 (47793)	2955

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EXAMINER	
PRENDERGAST, ROBERTA D	
ART UNIT	**PAPER NUMBER**
2628	

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/730,526	MORIKAWA, NAOTO	
	Examiner	Art Unit	
	Roberta Prendergast	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 December 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Examiner acknowledges that the amendment to the specification filed on 11/30/2005 now refers to Fig. 4 (step 230), Fig. 10 (element 14), and Figs. 12-13.

However, the drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Fig. 28 is disclosed on page 25, paragraph [0145]. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 3 and 4 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 1 and 2 have been amended to include the limitations of their respective dependent claims 3 and 4, i.e. four identical faces which are isosceles triangles.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 5 and 6 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. A shape processing program for reproducing the shape of an object in a three-dimensional space is not claimed as embodied in a computer-readable media.

Data structures not claimed as embodied in computer-readable material are descriptive material *per se* and are not statutory because they are not capable of causing functional change in the computer. Such claimed data structures do not define any structural and functional interrelationships between the data structure and other claimed aspects of the invention, which permit the data structure's functionality to be realized.

Amending claims 5 and 6 to read "A shape processing program embodied in a computer-readable media for reproducing ..." will be sufficient to overcome this rejection.

Claim Rejections - 35 USC § 112

Examiner acknowledges the amendment to claims 1-7 dated 11/30/2005, overcoming the 35 U.S.C. 112, second paragraph rejection and therefore the 35 U.S.C. 112, second paragraph rejections of claims 1-7 is hereby withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meshkat U.S. Patent No. 5553206 in view of Applicant's admitted prior art (APA), Schaedel U.S. Patent No. 6264199, and Rossignac et al. U.S. Patent No. 5825369.

Referring to claim 1, Meshkat teaches a shape processor for imitating the shape of an object in a three-dimensional space (column 4, lines 34-38, i.e. the shape processor system is a graphics system having finite element analysis capability with the means for performing the method being described) comprising a reference information

acquiring unit for acquiring reference body information for specifying the shape of reference body which is a tetrahedron composed of four identical faces, side setting information for setting two sides of said reference body in a twisted position as first and second sides, and face setting information for setting two faces sharing said first side of said reference body as first and second faces (Figs. 4A and 4B; column 5, lines 26-35 and 49-67; column 6, lines 1-7 and 36-67, i.e. quadrilateral pairs of ; column 7, lines 30-62, i.e. tetrahedral ABCE is comprised of a front side with two faces ABC and BCE sharing an edge BC and a back side with two faces CAE and BAE sharing an edge AE, tetrahedral BCDE is comprised of a front side with two faces CDE and BDE sharing an edge BD and a backside with two faces BCD and BCE sharing an edge CE, it is understood that a system having processing capabilities for acquiring reference information is comprised of a reference information acquiring unit); an approximating unit for imitating the shape of an object using said reference bodies, by putting said first side of said first reference body on said second side of said second reference body and putting either said first or second face of said first reference body on the corresponding face of said second reference body, according to the information representing the shape of the object and the information acquired by said reference information acquiring unit (Fig. 4A and 4B; column 7, lines 30-62, i.e. the front side of tetrahedral ABCE is placed on the second side of tetrahedral BCDE at the common edge BC and the second face BCE of tetrahedral ABCE is placed on corresponding face BCE of tetrahedral BCDE and the common faces are merged to create a quadrilateral face pair comprised of faces ABC and BCD, it is understood that a system having processing capabilities for

acquiring approximation information is comprised of an approximating unit); and an approximation information storage unit for storing approximation information representing which of said first and second faces of said first reference body is put on the corresponding face of said second reference body (Figs. 4A and 4B, 10, 13 and 14; column 7, lines 30-62; column 8, lines 1-44; column 10, lines 8-53, i.e. it is understood that a system having processing capabilities for acquiring all of the information described above is comprised of an approximation information storage unit for storing approximation information in the search trees and graphs described by Meshkat) but does not specifically teach wherein the tetrahedron are composed of such four identical isosceles triangles that the ratio of length of its sides is 2 : sqrt (3) : sqrt (3); assigning the values of 0 to one of the two faces sharing said first side, and for assigning 1 to the other of the two faces sharing said first side; forming a chain of the reference bodies by connecting said first side of a first reference body and said second side of a second reference body, and for imitating the shape of an object using the chain of said reference bodies representing which of said first and second faces of said first reference body is put on the corresponding face of said second reference body by a sequence of 0 or 1 assigned to one two faces of said reference body which is put on the corresponding face of the adjacent reference body.

Applicant's APA teaches wherein the tetrahedron are composed of such four identical isosceles triangles that the ratio of length of its sides is 2 : sqrt (3) : sqrt (3) (page 1, RELATED ART, paragraph [0003]; page 11, SUMMARY OF THE INVENTION,

paragraph [0052]; page 22, DETAILED DESCRIPTION OF THE INVENTION, paragraph [0132], i.e. applicant's admitted prior art).

Schaedal teaches using reference bodies where each reference body is a tetrahedron composed of such four identical isosceles triangles (column 2, lines 37-46 and 53-67; column 3, lines 48-52; columns 5-6, lines 64-7, i.e. all-space filling); connecting each reference body with another one or two reference bodies to form a chain at the longer edges in such a way that two faces of a reference body can be brought into contact with the corresponding faces of the following reference body, one pair at a time, by rotation around the longer edge shared by the two reference bodies; encoding the shape by specifying the folding of the chain, i.e., the folding at each longer edge between two consecutive reference bodies in said chain (column 6, lines 8-25, i.e. each pair of tetrahedrons will fold along their common base edge); assigning the values of 0 and 1 to the two faces of said reference body which share a longer edge, 0 for a face and 1 for the other, in advance (Figs. 20-21; column 10, lines 18-26, i.e. plus and minus are understood to be 1's and 0's); and using the values to describe the folding at the longer edges, that is, which face of said reference body is in contact with the corresponding face of said following reference body (Figs. 20-21; column 10, lines 18-26, i.e. self-attracting indicates that the plus faces are attracted to the minus faces indicating that the reference bodies should be folded in such a way as to allow these faces to touch).

Rossignac et al. teaches wherein the method comprises the steps of encoding the shape into a sequence of 0 and 1 using reference bodies (Figs. 6, 8, 9, 17, and 18;

column 5, lines 21-40; column 6, lines 4-32; column 12, lines 20-30); connecting each reference body with another one or two reference bodies to form a chain (Figs. 9C and 15 (element 15500)); encoding the shape by specifying the folding of the chain, i.e., the folding at each longer edge between two consecutive reference bodies in said chain; assigning the values of 0 and 1 to the two faces of said reference body which share a longer edge, 0 for a face and 1 for the other, in advance (column 9, lines 43-52, i.e. it is understood that A and B can be represented as 1 and 0 and a marching record indicates which faces are to be connected).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method of Meshkat to include the teachings of Applicant's APA, Schaedal, and Rossignac et al. because such tetrahedrons can be fitted together to fill a three-dimensional space without overlaps and gaps (see applicant's APA found in the specification: page 1, RELATED ART, paragraph [0003], lines 1-5) thereby providing for the construction of a great variety of different shapes for educational and entertainment purposes and for allowing the tetrahedral chains to form various random solid shape that are all-space filling with no irregular gaps or voids between or among the surfaces of the contracted shape (Schaedal: column 1, lines 59-65; column 2, lines 36-40 and 50-65\) and further because binary encoding provides a method of representing the connectivity information without loss of information in a compressed form (Rossignac et al.: column 5, lines 42-55).

Referring to claim 2, claim 2 is similar in scope to claim 1 (i.e. the reproducing unit of claim 2 is understood to be the approximating unit of claim 1) and therefore the rationale for the rejection of claim 1 is incorporated herein.

Referring to claims 3 and 4, claims 3 and 4 are similar in scope to claims 1 and 2 respectively and therefore the rationale for the rejection of claims 1 and 2 is incorporated herein.

Referring to claims 5 and 6, claims 5 and 6 are similar in scope to claims 1 and 2 respectively and therefore the rationale for the rejection of claims 1 and 2 is incorporated herein, Meshkat teaches a shape processing program for imitating the shape of an object in a three-dimensional space, the shape processing program comprising a reference information acquiring module, an approximating module, and an approximation information storage module for performing the shape processing steps described in claims 1 and 2 above (Fig. 17; column 4, lines 39-46, i.e. it is understood that a computer program product including a recording medium and instructions, recorded on the medium for directing the processing system to execute the method of Meshkat is comprised of a reference information acquiring module, an approximating module, and an approximation information storage module for directing the reference information acquiring unit, approximating unit, and approximation information storage unit of claims 1 and 2 to perform their respective functions).

Referring to claim 7, the rationale for claims 1 and 2 are incorporated herein, Meshkat, as modified above, teaches a shape encoding method which encodes the shape of a given object in a three-dimensional space by representing the relation

among reference bodies obtained by dividing the object wherein each reference body is a tetrahedron composed of such four identical isosceles triangles that the ratio of length of its sides is 2 : sqrt (3) : sqrt (3), connecting each reference body with another one or two reference bodies, and describing which face of said reference body is in contact with the corresponding face of said following reference body (see the rationale for claims 1-4 above) but does not specifically teach wherein the method comprises the steps of encoding the shape into a sequence of 0 and 1 using reference bodies where each reference body is a tetrahedron composed of such four identical isosceles triangles that the ratio of length of its sides is 2 : sqrt (3) : sqrt (3); connecting each reference body with another one or two reference bodies to form a chain at the longer edges in such a way that two faces of a reference body can be brought into contact with the corresponding faces of the following reference body, one pair at a time, by rotation around the longer edge shared by the two reference bodies; encoding the shape by specifying the folding of the chain, i.e., the folding at each longer edge between two consecutive reference bodies in said chain; assigning the values of 0 and 1 to the two faces of said reference body which share a longer edge, 0 for a face and 1 for the other, in advance; and using the values to describe the folding at the longer edges, that is, which face of said reference body is in contact with the corresponding face of said following reference body.

Schaedal teaches using reference bodies where each reference body is a tetrahedron composed of such four identical isosceles triangles (column 2, lines 37-46 and 53-67; column 3, lines 48-52; columns 5-6, lines 64-7, i.e. all-space filling);

connecting each reference body with another one or two reference bodies to form a chain at the longer edges in such a way that two faces of a reference body can be brought into contact with the corresponding faces of the following reference body, one pair at a time, by rotation around the longer edge shared by the two reference bodies; encoding the shape by specifying the folding of the chain, i.e., the folding at each longer edge between two consecutive reference bodies in said chain (column 6, lines 8-25, i.e. each pair of tetrahedrons will fold along their common base edge); assigning the values of 0 and 1 to the two faces of said reference body which share a longer edge, 0 for a face and 1 for the other, in advance (Figs. 20-21; column 10, lines 18-26, i.e. plus and minus are understood to be 1's and 0's); and using the values to describe the folding at the longer edges, that is, which face of said reference body is in contact with the corresponding face of said following reference body (Figs. 20-21; column 10, lines 18-26, i.e. each diamond face contains two triangle faces in a hinged adjacent relationship and that each triangle face having a "plus" connector is surrounded by adjacent triangular faces having "minus" connectors and vice versa and self-attracting indicates that the plus faces are attracted to the minus faces indicating that the reference bodies should be folded in such a way as to allow these faces to touch).

Rossignac et al. teaches wherein the method comprises the steps of encoding the shape into a sequence of 0 and 1 using reference bodies (Figs. 6, 8, 9, 17, and 18; column 5, lines 21-40; column 6, lines 4-32; column 12, lines 20-30); connecting each reference body with another one or two reference bodies to form a chain (Figs. 9C and 15 (element 15500)); encoding the shape by specifying the folding of the chain, i.e., the

folding at each longer edge between two consecutive reference bodies in said chain; assigning the values of 0 and 1 to the two faces of said reference body which share a longer edge, 0 for a face and 1 for the other, in advance (column 9, lines 43-52, i.e. it is understood that A and B can be represented as 1 and 0 and a marching record indicates which faces are to be connected).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system and method of Meshkat to include the teachings of Applicant's APA, Schaedal, and Rossignac et al. because such tetrahedrons can be fitted together to fill a three-dimensional space without overlaps and gaps (see applicant's APA found in the specification: page 1, RELATED ART, paragraph [0003], lines 1-5) thereby providing for the construction of a great variety of different shapes for educational and entertainment purposes and for allowing the tetrahedral chains to form various random solid shape that are all-space filling with no irregular gaps or voids between or among the surfaces of the contracted shape (Schaedal: column 1, lines 59-65; column 2, lines 36-40 and 50-65\) and further because binary encoding provides a method of representing the connectivity information without loss of information in a compressed form (Rossignac et al.: column 5, lines 42-55).

Referring to claim 8, claim 8 is similar in scope to claims 1, 2 and 7 respectively and therefore the rationale for the rejection of claims 1, 2 and 7 is incorporated herein.

Response to Arguments

Applicant's arguments filed 11/30/2005 have been fully considered but they are not persuasive.

Applicant first argues, with respect to claims 5, and 6 that "...claims 5 and 6 are directed to software code, which is patentable subject matter under 35 U.S.C. j 101, as held by the Federal Circuit in the Eolas case, as presented above. Therefore, Applicant submits that the objection of claims 5 and 6 under 35 U.S.C. j 101 is improper and should be withdrawn...". Examiner respectively submits that a program is merely a set of instructions capable of being executed by a computer, the computer program itself is not a process and therefore a computer program, without the computer-readable medium needed to realize the computer program's functionality, is nonstatutory functional descriptive material.

Applicant's arguments with respect to claims 1, 2, 5, and 6 have been considered but are moot in view of the new ground(s) of rejection.

Applicant next argues, with respect to claims 3, 4 and 7 that "...the combination of Meshkat and Figs. 17-26 fails to form the invention defined by claims 3 and 4. Thus, the rejection of claims 3 and 4 under 35 U.S.C. j 103(a) would have been improper even if Figs. 17-26 are proper prior art...". Examiner respectively submits that Figs. 17-26 were not cited as applicant's APA in the rejection of claims 3 and 4 and requests that applicant look to the paragraphs of the specification cited in the rejection of claims 3 and 4 above for applicant's APA.

Applicant then argues, with respect to claim 7, that "...in the chain of tetrahedrons obtained by assembling Fig. 20 of Schaedel, the same value is assigned to both of two faces sharing a side which connects tetrahedrons. Therefore, the teaching of Schaedel cannot specify the folding of the chain by the sequence of 0 and 1 ...". Examiner respectively submits that col. 10, lines 18-26 clearly indicate that each diamond face contains two triangle faces in a hinged adjacent relationship and that each triangle face having a "plus" connector is surrounded by adjacent triangular faces having minus connectors and vice versa, as shown in Fig. 21.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberta Prendergast whose telephone number is (571) 272-7647. The examiner can normally be reached on M-F 7:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RP

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER